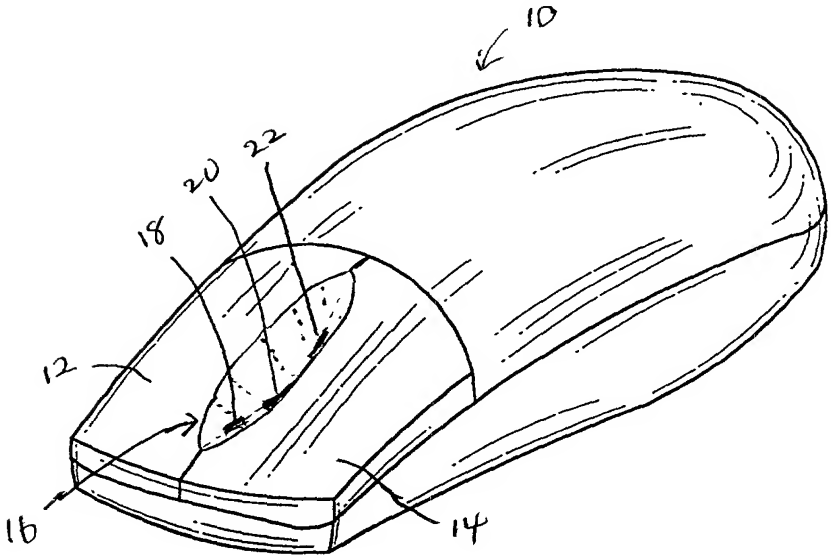


FIG. 1

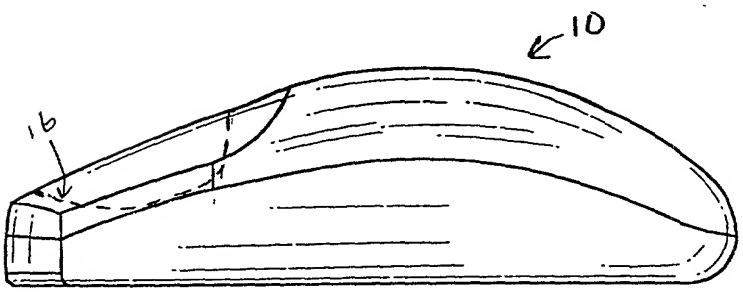


FIG. 2

FIG. 3

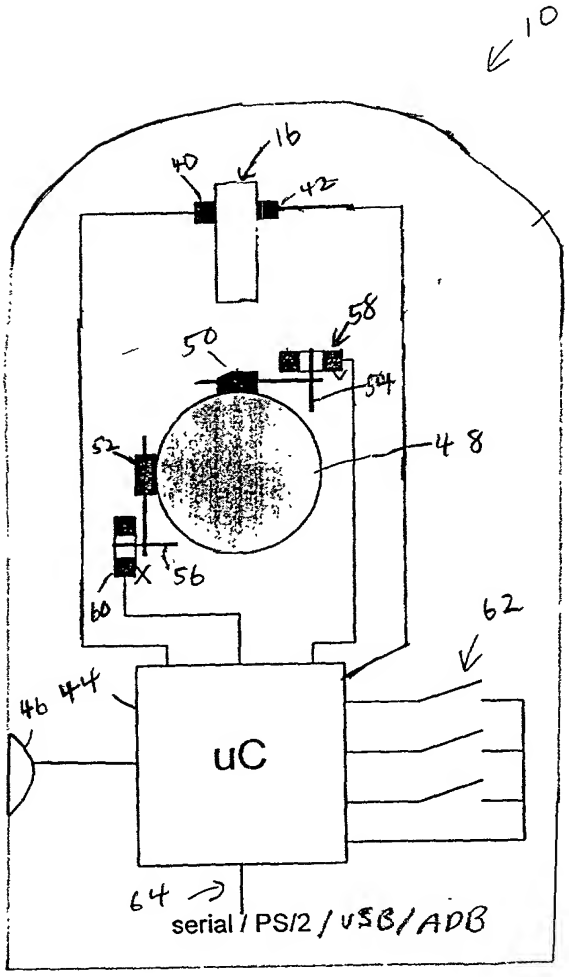


FIG. 4

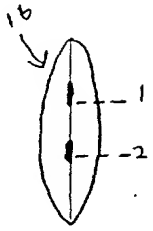


FIG. 5A

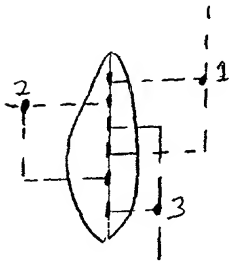


FIG. 5B

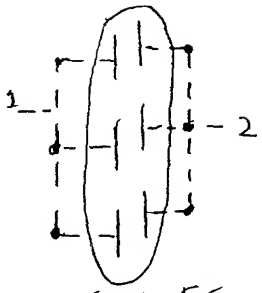


FIG. 5C

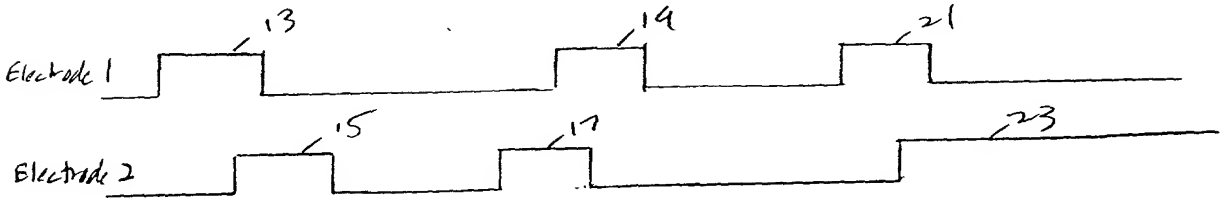


FIG. 5D

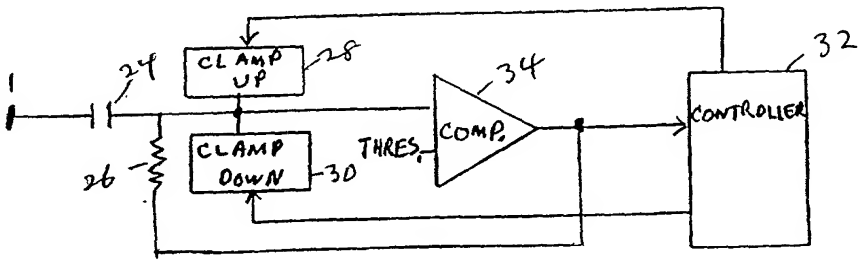


FIG. 6

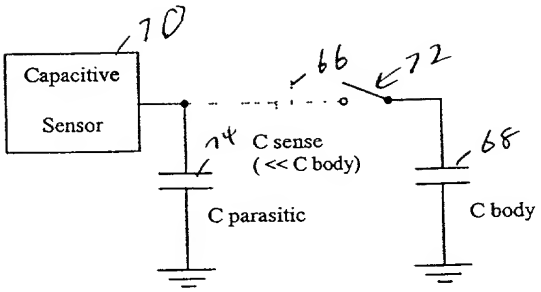


FIG. 7A

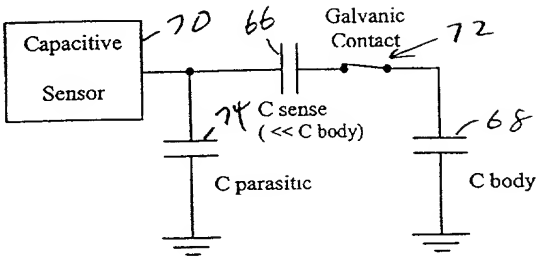


FIG. 7B

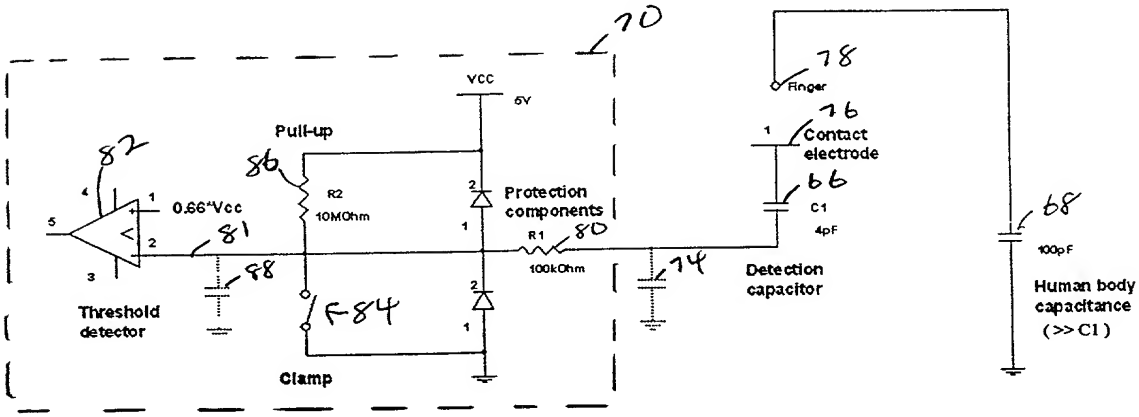


FIG. 8

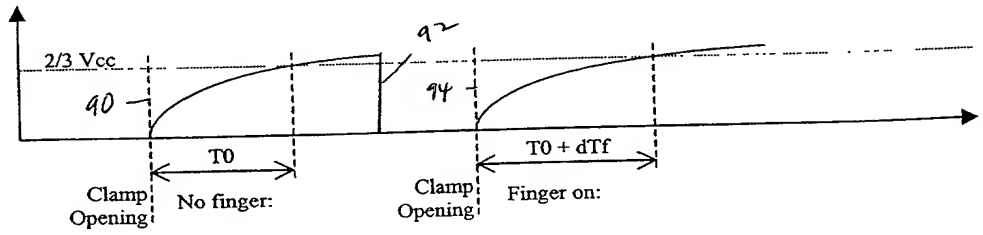


FIG. 9

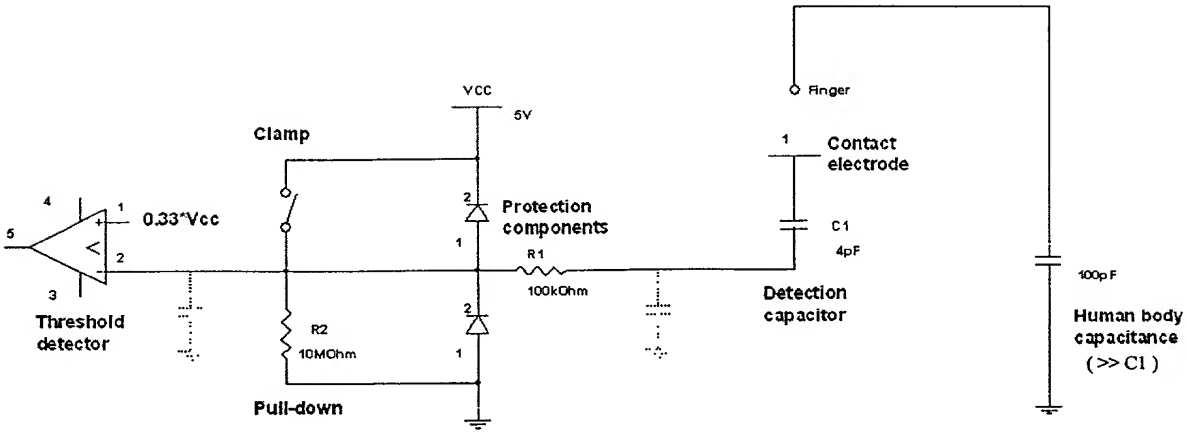

Vcc
5V
Clamp
Finger
1
Contact electrode
4
5
1
0.33*Vcc
2
3
Threshold detector
2
Protection components
1
R1
100kOhm
C1
4pF
Detection capacitor
100pF
Human body capacitance
(>> C1)
R2
10MOhm
2
1
Pull-down

FIG. 10

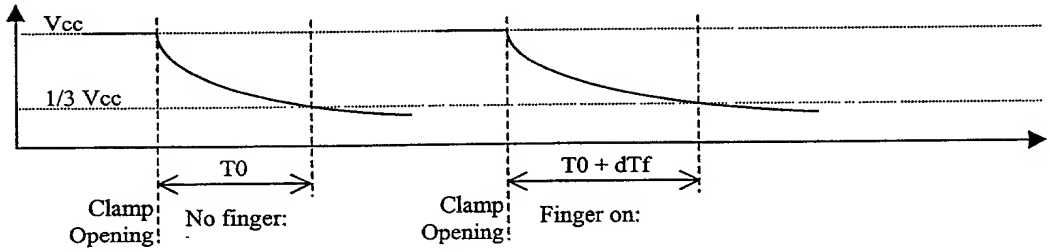

Vcc
1/3 Vcc
T0
T0 + dTf
Clamp Opening
No finger:
Clamp Opening
Finger on:

FIG. 11

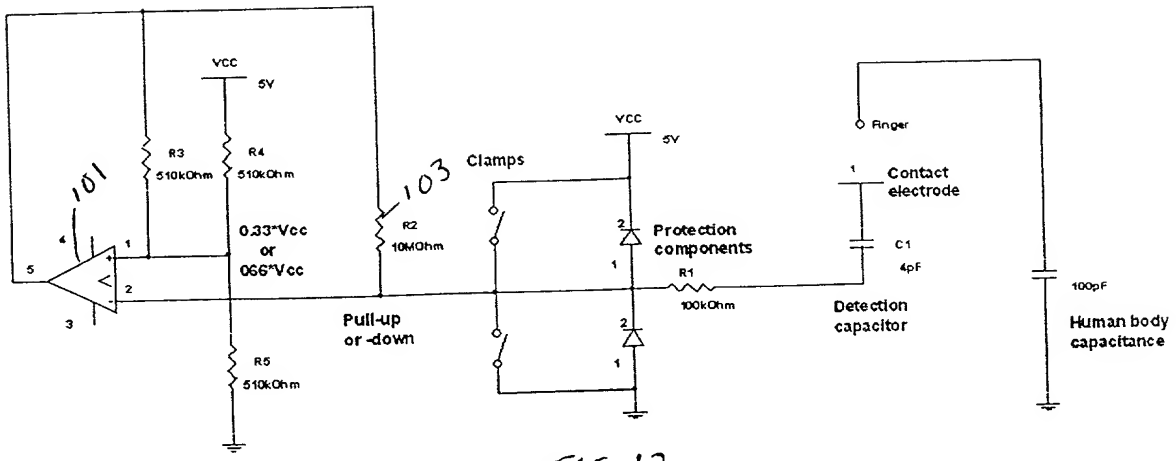


FIG. 12

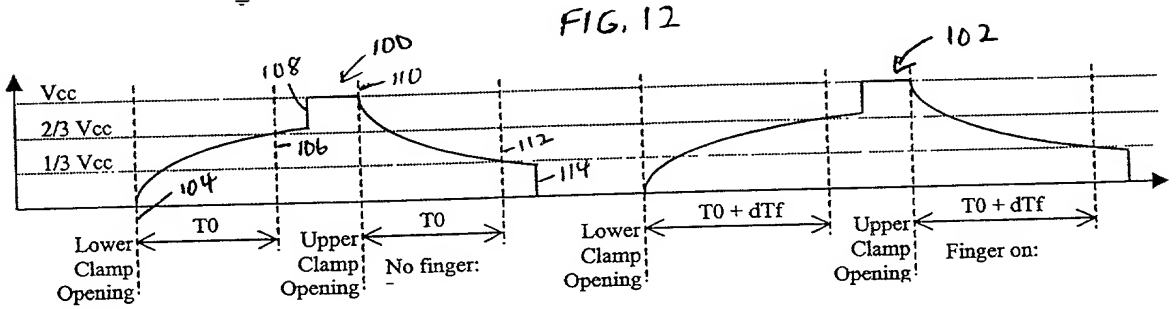


FIG. 13

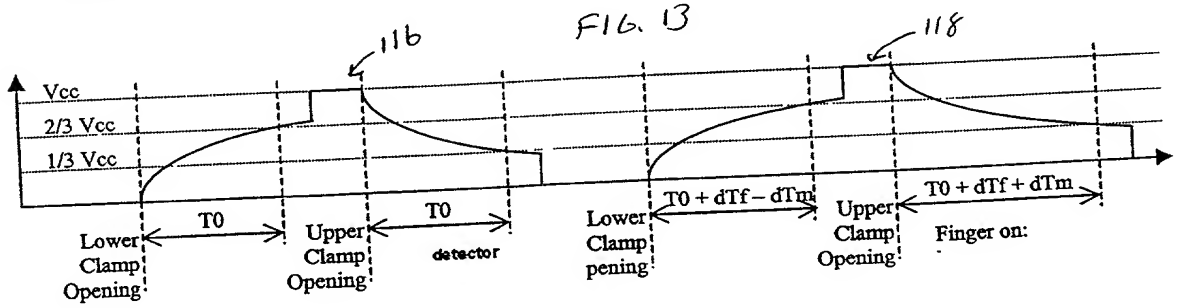


FIG. 14

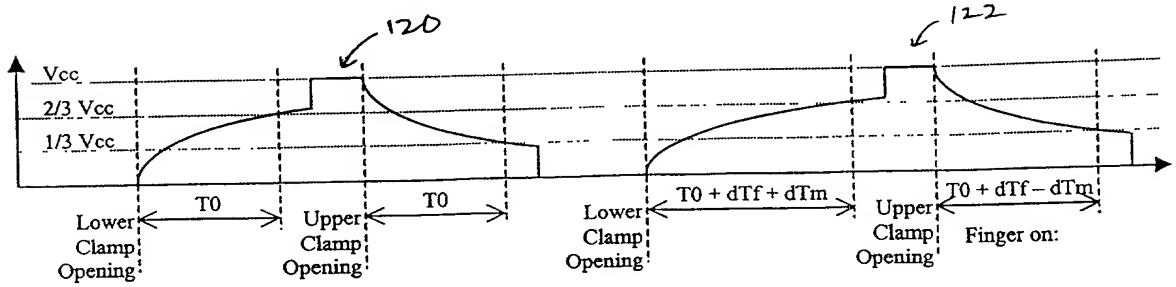


FIG. 15

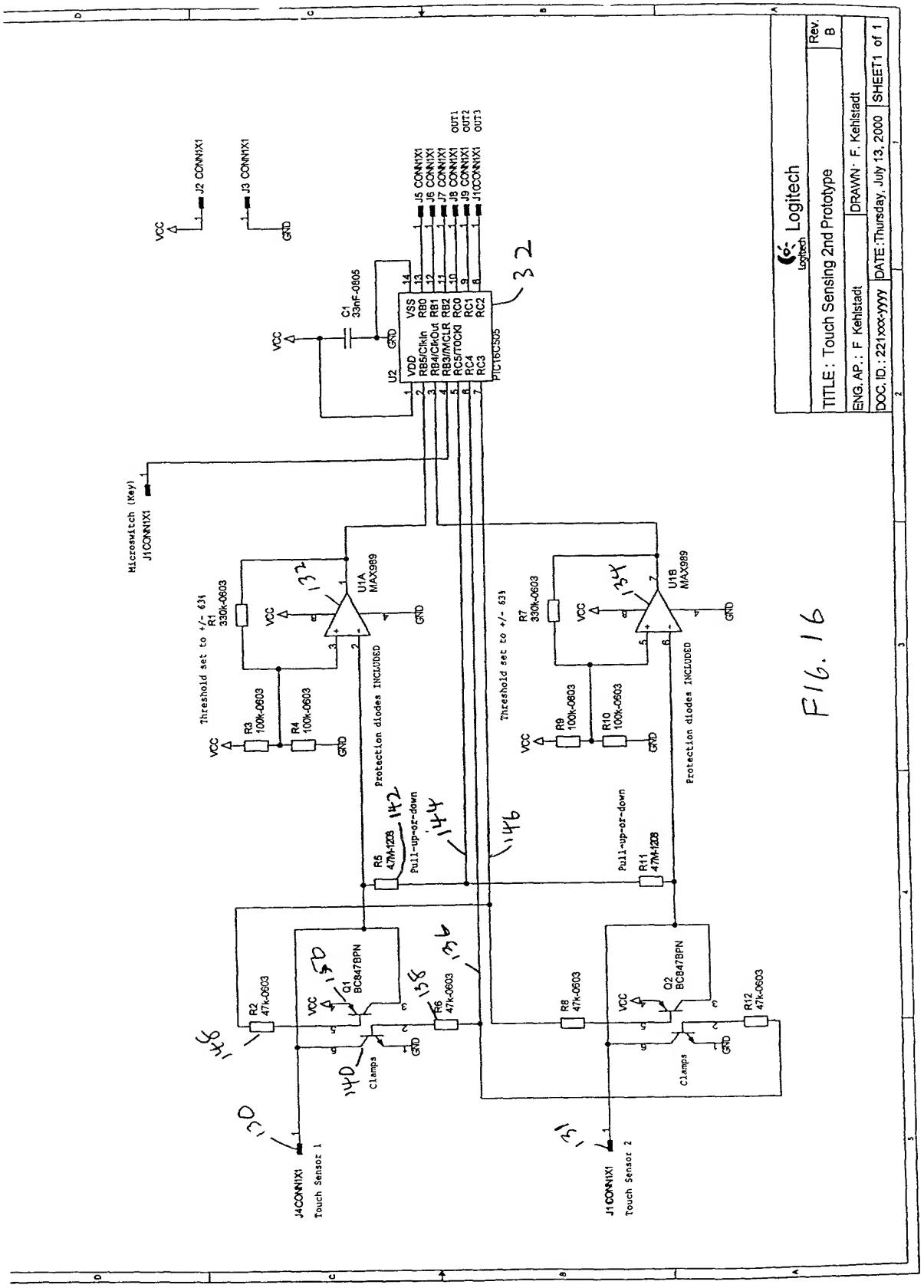

Logitech
TITLE: Touch Sensing 2nd Prototype
Rev. B
ENG. AP.: F. Kehlstadt
DRAWN: F. Kehlstadt
DOC. ID.: 221xxx-yyyy
DATE: Thursday, July 13, 2000
SHEET1 of 1
J2 CONN1X1
J3 CONN1X1
VCC
GND
J5 CONN1X1
J6 CONN1X1
J7 CONN1X1
J8 CONN1X1
J9 CONN1X1
J10CONN1X1
OUT1
OUT2
OUT3
C1
33nF-0805
U2
PIC16C505
VDD
VSS
RB5/CIkin
RB0
RB4/CIkOut
RB1
RB3/MCLR
RB2
RC5/TOCKI
RC0
RC4
RC1
RC3
RC2
Microswitch (Key)
J1CONN1X1
U1A
MAX989
U1B
MAX989
R1
330k-0603
R3
100k-0603
R4
100k-0603
R7
330k-0603
R9
100k-0603
R10
100k-0603
Threshold set to +/- 63i
Protection diodes INCLUDED
R5
47M-1206
R11
47M-1206
Pull-up-or-down
R2
47k-0603
R6
47k-0603
R8
47k-0603
R12
47k-0603
Q1
BC847BPN
Q2
BC847BPN
Clamps
J4CONN1X1
Touch Sensor 1
J1CONN1X1
Touch Sensor 2
132
134
142
144
146
148
150
152
154
156
158
160
161

FIG. 16

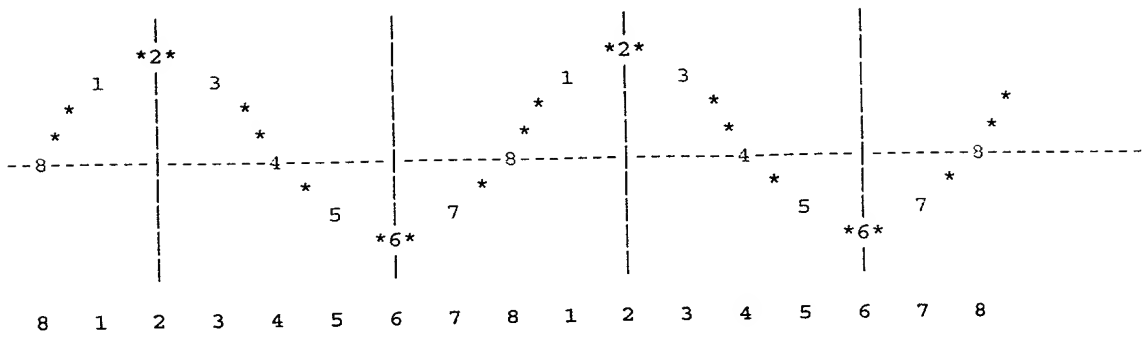


FIG. 17

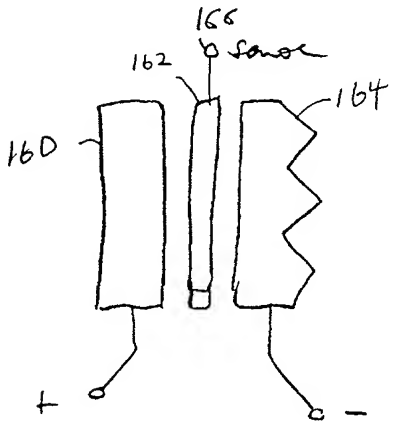


FIG. 18

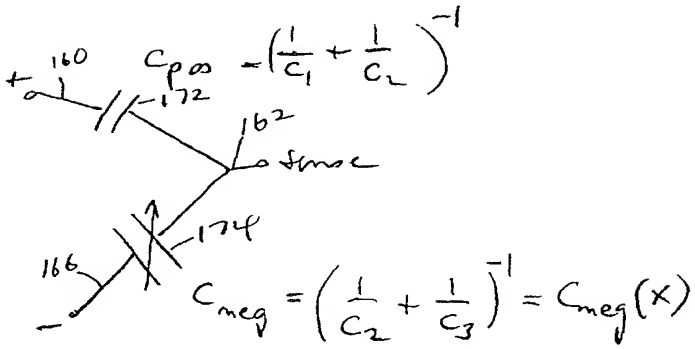


FIG. 19

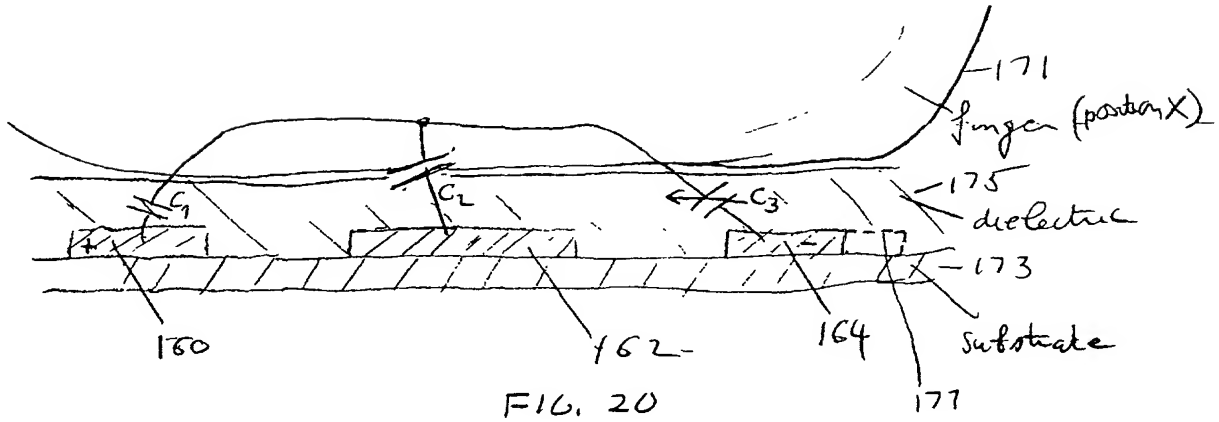
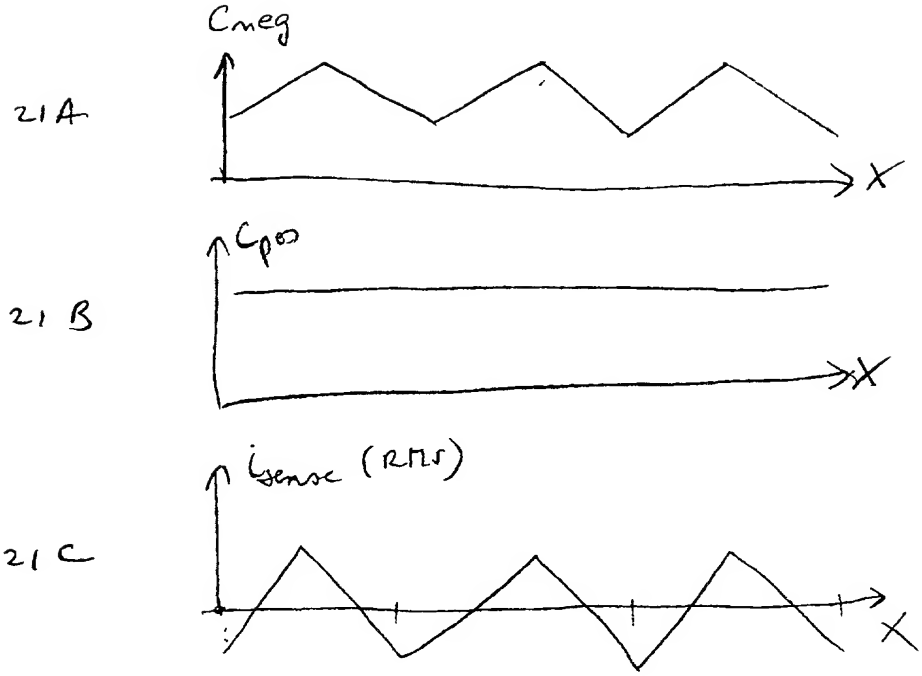


FIG. 20


21A
Cneg
X
21B
Cpos
X
21C
Isense (RMS)
X

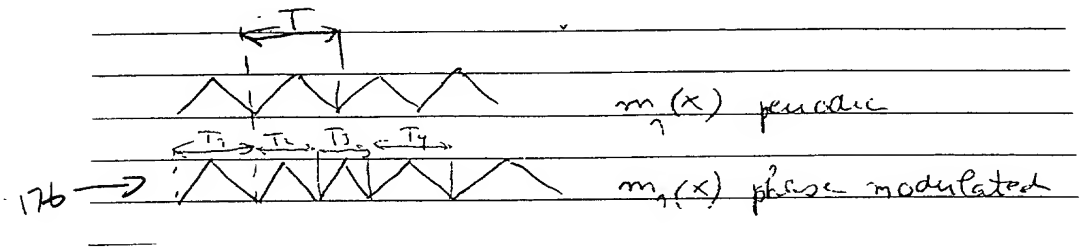

T
$m_1(x)$ periodic
T_1 T_2 T_3 T_4
176
$m_1(x)$ phase modulated

FIG. 22

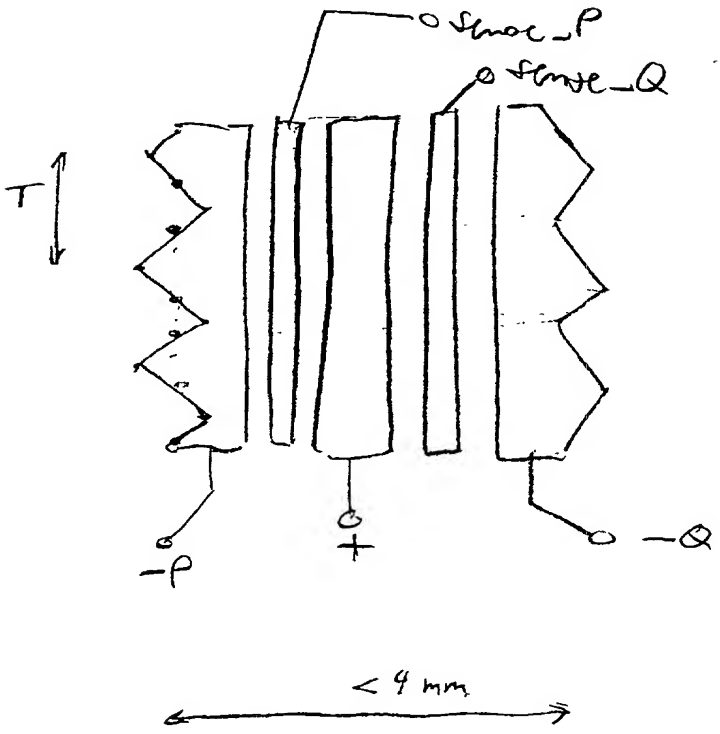

sense_P
sense_Q
T
+
−P
−Q
< 4 mm

FIG. 23